



FAA IA refresher approved



September 2011

TPE 331 *Engine* 1 Day Training

Good training that includes *rigging and trouble shooting* will save your organization money now and in the future!

- *Training generally does provide short term benefits* but its an even better *long term solution* that becomes even more beneficial over the long term with an ongoing training program in place. Good training allows you to operate economically and ahead of the power curve **so your company doesn't** become desperate for a temporary fix!
- **Improved systems knowledge** results in a reduction in what's referred to as the shotgun or dart board trouble shooting techniques. These outdated parts changing approaches are **costly** in terms of *parts replaced and labor consumed* in doing so, plus the aircraft is **out of service longer and losing revenue during this lengthy process**.
- Some engine specific training for the pilots, can help them provide a more accurate description of the engine problem if it occurs which will help maintenance solve the issue **quicker and less costly**.

The TPE331 engines have *some significant advantages* over the PT6 but the TPE331 may be more easily damaged in certain operating ranges!

- As a result *it's very important* that the engine operators (pilots and mechanics) are properly trained so they are *fully aware of all these issues so that the best practices are known and used* during engine operation.

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- You must have a plan during all engine starts. That includes having your hand on the stop switch or the manual emergency shutdown lever as required during starts and be prepared to act promptly if required.
- You *can't* take your eye off the temperature gauge during start.
- You *can't* take your eye off the RPM gauge during starts within the (18 to 28% RPM) critical range!
- Don't put off fixing problems that result in weak starter energy. Issues such as a bad starter, low batteries, a weak power cart and etc, can damage your engine.
- Closely monitor *every start, day after day*, if a change occurs and it's too slow or too hot, don't put it off and continue to operate. **Fix it!**
- Higher powered aircraft start systems such as the Fast Start System, high voltage power carts or external battery carts are *beneficial* and make the engine **less likely to have start problems.**

The CD Aviation 1 day training class consists of over 200 colored slides via a power point presentation and each student will get their own *personal colored training manual to take home.*

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The training material covered expands upon the subject material listed below.

- CD overview
- TPE History
- Airflows
- Horsepower
- Free turbine design
- Fixed shaft design
- Fuel consumption
- Cost comparison
- Engine power
- EGT / ITT systems
- Power runs
- Beta and PG modes
- Start procedures
- Cockpit troubleshooting
- Fuel nozzle maintenance
- Carbon erosion
- Cost savings
- Engine description

The training material includes many student questions and the class participation during the open forum class structure results in an enhanced learning experience for those in attendance.

Upon completion the students will be awarded a certificate. The material is **FAA IA refresher approved** and CD Aviation Services is a **Honeywell Authorized Service Center**.



Trainer background:

I completed my 4 year USAF tour of duty followed by A&P training at Spartan in Tulsa, Oklahoma and subsequently obtained my A&P license in June of 1972. My general aviation experience since obtaining my license is now at 39 years and counting. During this interval I have had some involvement with other engine models but the majority of my experience has been on the TPE331 engine series.

I have held numerous positions over the years including mechanic, lead man, crew chief, engine shop manager, factory field service engineer; parts brokerage Garret engine program manager, maintenance sales manager and maintenance training manager.

I believe my long and varied background gives me the technical experience necessary to provide the customized training required for your personnel on the TPE331 engine models. Over the years I have learned the value of good, easy to understand communication which I believe I am able to utilize during this maintenance training. I look forward to working with you on your training needs in the future.

Regards,

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Sample of 12 Training Manual Slides

Trouble Shooting

WHY IS RPM TOO LOW?
HOW DO YOU FIX THE PROBLEM?
COULD YOU DEVELOP MORE POWER WITH THE SRL EGT BREAKER PULLED?

	POWER LEVERS PL	CONDITION LEVERS CL
PA	1000 feet	
OAT	90°F	
TARGET TORQ	700 HP	
BETALIGHT	OFF	OFF
RPM	100% 99%	
EGT	612°C 620°C	
HP	100 HP 700 HP	
	100/200 450/200	

CD Aviation Services TPE331 Line Maintenance Course - Section I 115

TO TURBINE BLADES WITH CAUTION EROSION DAMAGE

CD Aviation Services TPE331 Line Maintenance Course - Section I 146

Constant Speed Operation

In a constant speed (fixed shaft engine) the propeller pitch or prop load plus the load from the compressor section together must offset by the turbine section power output.

The balance between turbine section power output and the load applied by the compressor section and the prop pitch must be equal to result in a fixed power and speed setting.

CD Aviation Services TPE331 Line Maintenance Course - Section I 35

Constant Speed Operation continued

CD Aviation Services TPE331 Line Maintenance Course - Section I 36

Bowed Rotor Reduction Procedure

After engine shut down and the hand cranking unit down, check for a complete stoppage to turn the prop until the first gear index mark appears, with a pointer across 40 prop.

Let the prop sit in this position for 4 to 5 minutes then slowly move the prop until the same pointer across 40 prop.

See attached chart for looking on the two cow index marks which is the degree required to turn rotating group 180 degrees to offset the bow. The bow is the amount at the first index mark.

CD Aviation Services TPE331 Line Maintenance Course - Section I 165

Operational Cost Savings

Provide your flight instructor with the following information to ensure the most efficient engine operation.

- Check for oil level that the engine is running on. If oil level is low, it will cause the engine to run hotter, which will cause the engine to run faster, which will cause the engine to run faster, which will cause the engine to run faster.
- Keep in mind that oil of the engine is the most important factor in the life of the engine and the aircraft.
- Remember to keep the engine at the proper RPM to keep the engine at the proper RPM.

CD Aviation Services TPE331 Line Maintenance Course - Section I 154

Other

CD Aviation Services TPE331 Line Maintenance Course - Section I 49

-12 ENGINE ON (CDAS JOPLIN) TEST CELL

A below is used to determine what the real torque is at the prop via the below digital torque readout and what the torque sensor pressure (raw delta P) are at these various below indicated power levels.

CD Aviation Services TPE331 Line Maintenance Course - Section I 56

Air flow stations continued

CD Aviation Services TPE331 Line Maintenance Course - Section I 20

First and Second Stage Turbine (Gas Generator)

CD Aviation Services TPE331 Line Maintenance Course - Section I 74

Beta and PG Modes of Operation

POWER LEVERS (PL) CONDITION LEVERS (CL)

PG (FLIGHT) FUEL PITCH PG

BETA (GROUND) PITCH FUEL USPG

REV

- The position of the power lever establishes the mode of operation.
- When the power lever is between flight idle and full reverse (red range) it establishes the BETA (ground) mode of operation.
- When the power lever is between flight idle and max (blue range) it establishes the PROP (flight) mode of operation.

CD Aviation Services TPE331 Line Maintenance Course - Section I 74

Woodward fuel control rigging mock up used during the 1 week line maintenance training class.

CD Aviation Services TPE331 Line Maintenance Course - Section I 79

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Sample of Training Questions

- If your engine reads 650 degrees at the T4 limit will you be allowed to adjust the compensator from min to max comp?
- With the SRL tuned off what is the EGT limit?
- What is the EGT limit on start? What is the SRL limit on takeoff?
- If your -10 engine has a temp limiter what value would you expect it to limit at?
- Why does the limiter system not prevent an engine over temp during a start?
- What effect would a low FI blade angle have on FI power in flight?
- What could cause the AC to float on landing? In some cases what do pilots attempt if this does occur?
- On takeoff the PL adds fuel and pitch? (T or F)
- What controls prop pitch in flight?
- Could a failed (negative or pos) EGT compensator result in an engine exceeding the T4 limit?
- On manual enrich starts when should enrich first be actuated?

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